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OKLAHOMA'S Forest Products Industry: Performance and Contribution to the State's Economy, 1970 to 1980

PSW FOREST AND RANGE
EXPERIMENT STATION

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Wilbur R. Maki, Con H Schallau, Bennett B. Foster, and Clair H. Redmond



Abbreviations

States

| | |
|----|----------------|
| AL | Alabama |
| AR | Arkansas |
| FL | Florida |
| GA | Georgia |
| KY | Kentucky |
| LA | Louisiana |
| MS | Mississippi |
| NC | North Carolina |
| OK | Oklahoma |
| SC | South Carolina |
| TN | Tennessee |
| TX | Texas |
| VA | Virginia |
| SO | South |
| US | United States |

Industries

| | |
|-----|------------------------------|
| FPI | Forest Products Industry |
| LWP | Lumber and Wood Products |
| PAP | Paper and Allied Products |
| WF | Wood Furniture |

Authors

WILBUR R. MAKI is a professor, University of Minnesota, Department of Agricultural and Applied Economics, St. Paul 55108. CON H SCHALLAU is a research economist at the Pacific Northwest Research Station, Forestry Sciences Laboratory, 3200 Jefferson Way, Corvallis, Oregon 97331. BENNETT B. FOSTER and CLAIR H. REDMOND are, respectively, forest economist and economist, USDA Forest Service, Southern Region, State and Private Forestry, 1720 Peachtree Road N.W., Atlanta, Georgia 30367.

Abstract

Maki, Wilbur R.; Schallau, Con H; Foster, Bennett B.; Redmond, Clair H.

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Employment and earnings in Oklahoma's forest products industry, like those of most Southern States, grew significantly between 1970 and 1980. In fact, Oklahoma's share of the Nation's forest products employment and earnings increased during this period. In 1980, lumber and wood products accounted for the largest share of the industry's employment, but paper and allied products had a larger share of the earnings. In 1977, pulp and allied products had higher productivity than either lumber and wood products or wood furniture.

Keywords: Forest products industries, economics (forest products industries), employment (forest products industries), Oklahoma.

Preface

Oklahoma's forest products industry, with the exception of wood furniture, experienced significant growth during the 1970's. To varying degrees, this growth reflects the increased investment in new plants and equipment and a growing demand for Oklahoma's forest products.

This report briefly describes Oklahoma's forest products industry—its composition, location, evolution, and relation to economic activity elsewhere in the State, the South, and the Nation.

Estimates of employment and earnings shown in this report were derived from U.S. Department of Commerce data. All references to dollar amounts are in constant 1977 dollars.

This is one in a series of reports for each of the 13 Southern States. These reports are companions to an analysis of the changing roles of the forest products industries of the South and the Pacific Northwest.

Highlights

- Between 1970 and 1980, Oklahoma's employment in the forest products industry—wood furniture, lumber and wood products, and paper and allied products—grew at a faster rate than the Nation's all-industry average (57 percent and 22 percent, respectively). Oklahoma's total earnings in the forest products industry nearly doubled, while the Nation's earnings increased by 27 percent.
- During the 1970's, Oklahoma's forest products industry increased its share of the Nation's employment and earnings in the forest products industry. Above average growth accounted for this performance. In 1980, for instance, Oklahoma had 2,500 more employees than it would have had if it had grown at the average rate for the industry between 1970 and 1980.
- The forest products industry was an important component of the economic base of several counties in southeastern Oklahoma, and its importance increased in these areas during the 1970's.

- Paper and allied products accounted for the largest share of value added in 1977 and was the fastest growing segment of Oklahoma's forest products industry in terms of employment and earnings. These changes reflect the construction of new processing facilities at the beginning of the decade.
- In 1977, average profits before taxes per worker hour (a commonly used measure of productivity) of Oklahoma's forest products industry were higher than those for most Southern States. Only 3 of the 13 Southern States had higher productivity.

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**The Forest
Products Economy
of Oklahoma**
The State's Work Force

Oklahoma's estimated full- and part-time work force in 1980 was comprised of an estimated 1.4 million employees and proprietors (see appendix 1, table 1, for sources of employment and earnings data). Oklahoma's work force grew considerably faster between 1970 and 1980 than did the national average (35.7 versus 22.3 percent). Total earnings—wage and salary payments and proprietorial income—also grew faster than the national average. Measured in constant 1977 dollars, the State's earnings increased by 37.0 percent compared with 27.4 percent for the Nation. As can be seen in the following tabulation, services, retail trade, manufacturing, and State and local government were the State's four largest employer categories:

| <u>Employers</u> | <u>Percent of total employment, 1980</u> | |
|--|--|-------------|
| | <u>Oklahoma</u> | <u>U.S.</u> |
| Major industries: | | |
| Services | 14.70 | 18.22 |
| Retail trade | 13.61 | 14.18 |
| Manufacturing (including forest products industry ^{1/}) | 13.35 | 19.15 |
| State and local government | 13.27 | 12.56 |
| Nonfarm proprietors | 7.89 | 6.58 |
| Agriculture | 7.65 | 4.39 |
| Mining | 5.07 | 0.97 |
| Transportation, communication, and public utilities | 4.91 | 4.84 |
| Wholesale trade | 4.88 | 4.97 |
| Finance, insurance, and real estate | 4.09 | 4.95 |
| Construction | 3.98 | 4.08 |
| Federal civilian | 3.36 | 2.81 |
| Federal military | 3.24 | 2.30 |
| Total | 100.00 | 100.00 |

^{1/}The forest products industry is comprised of (1) lumber and wood products (SIC 24), except mobile homes (SIC 2451); and (2) wood furniture manufacturing (SIC 2511, 2512, 2517, 2521, 2541) and paper and allied products (SIC 26).

Components of the State's Economic Base

Along with total employment there is another and perhaps more important way to judge an industry's contribution to Oklahoma's economy. For the State's economy to grow and develop, it must attract new dollars so residents can buy goods and services produced elsewhere. The industries that export products and services beyond local boundaries (that is, to elsewhere in the State, to other States, and to the world) and bring in new dollars constitute the area's economic base. Generally speaking, most manufacturing employment is classified as "economic base" (or "basic"); residentiary employment (for example, barber shops, realty firms, schools, and local government) is primarily geared to producing for local needs. Some services, however, may be basic; for example, Federal military provides national defense for all the Nation's citizens, and taxpayers outside Oklahoma provide financial support for this activity.

Residentiary employment is supported by the economic base. Money flowing in provides income for wage earners and entrepreneurs to spend on locally purchased goods and services. In most cases, the economic growth of a region is dependent on the success of its economic base.

We used the excess employment technique to identify the industries that comprise Oklahoma's (or sub-State district's) economic base. This approach accepts the national distribution of employment among industries as a norm. Any industry with employment in excess of this norm is considered to be producing for export markets outside the State (or sub-State district) and is part of Oklahoma's economic base. The percentage of Oklahoma's excess employment served as an indicator of the State's dependency on a particular industry for generating new dollars from outside the State (table 2 shows how excess employment and industry dependency indicators for Oklahoma were calculated). A particular industry may be basic at the local level but not at the State level.

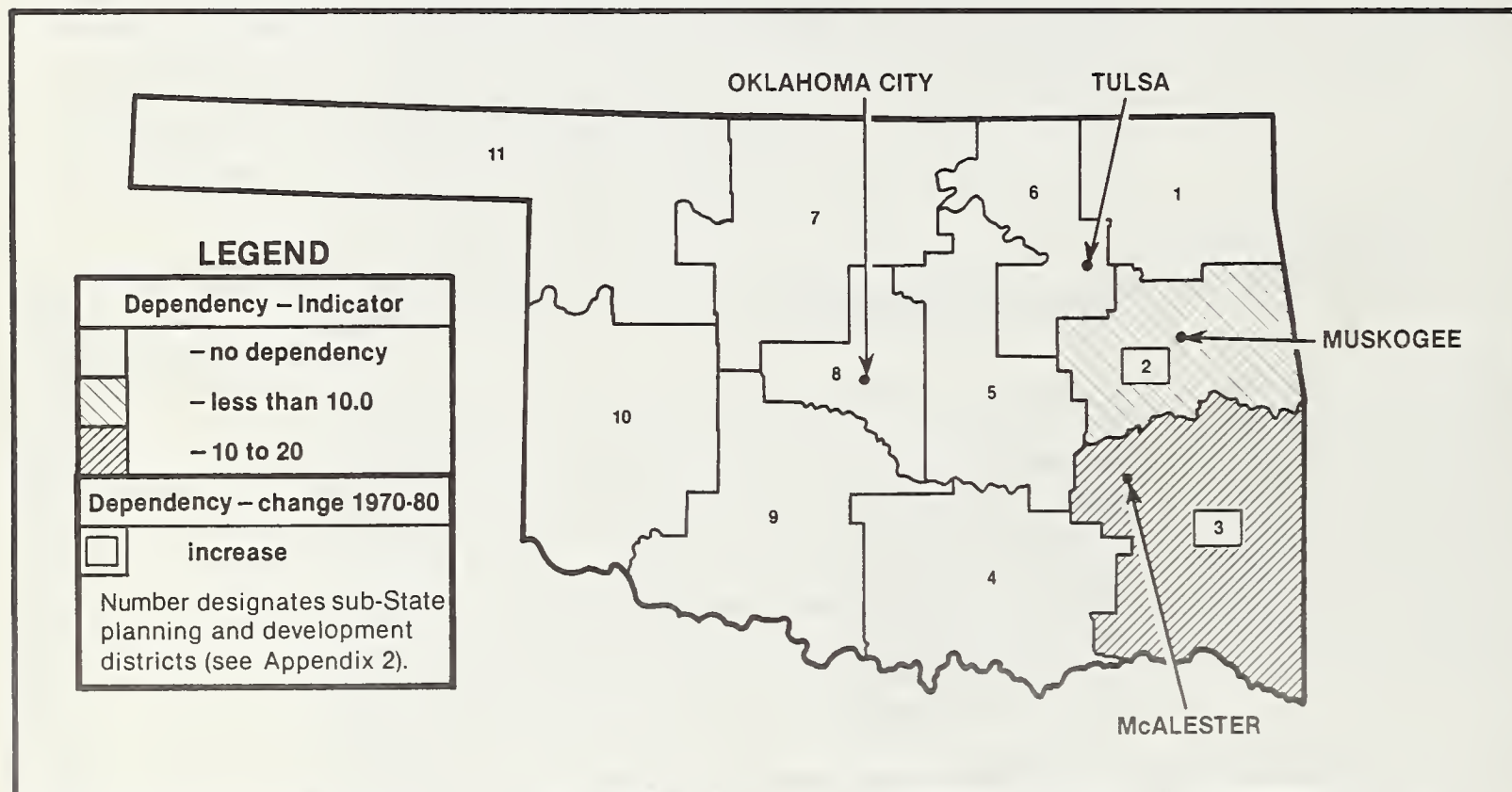
In 1980, 10 industries accounted for 94.8 percent of the State's excess employment—that is, its economic base (see tabulation below). Though these same industries accounted for only a slightly larger share (95.8 percent) in 1970, the change in shares of certain individual industries is noteworthy. In 1970, agriculture was the largest component of the State's economic base. By the end of the 1970's, agriculture was surpassed by oil and gas extraction, reflecting the Nation's response to OPEC's (Organization of Petroleum Exporting Countries) pricing policies. The Federal military and civilian components declined substantially between 1970 and 1980.

Crosshauling goods and services among States and regions can influence the importance of a particular industry. For example, an industry may be exporting beyond a State's boundaries at the same time as its products are being imported from outside the State. If the dollar value of imported goods or services equals or exceeds that produced locally, the industry does not qualify as basic. In other words, the industry is not earning net new dollars from the outside world. It is common for a local industry to produce in excess of local needs while the State must import more of the same to satisfy all its requirements. Such is the case in Oklahoma's forest products industry. Forest products are exported to customers outside Oklahoma, but overall the State is a net importer. Consequently, at the State level the forest products industry does not account for any of Oklahoma's excess employment. We take this to mean that Oklahoma is a net importer of forest products. We shall see later, however, that the forest products industry is a basic industry in two of the State's rural sub-State districts.

| <u>Economic base industries</u> | <u>Dependency indicator</u> | |
|---------------------------------|-----------------------------|-------------|
| | <u>1970</u> | <u>1980</u> |
| | (Percent of economic base) | |
| Oil and gas extraction | 18.20 | 33.53 |
| Agriculture | 33.72 | 27.11 |
| Self-employed | 12.50 | 10.63 |
| Federal military | 11.44 | 7.49 |
| Federal civilian | 12.63 | 4.47 |
| Petroleum refining | 3.54 | 3.22 |
| Machinery, excluding electrical | 0 | 3.17 |
| Air transportation | 2.03 | 1.96 |
| Trucking and warehousing | .68 | 1.89 |
| Pipeline transportation | 1.06 | 1.31 |
| Subtotal | 95.80 | 94.78 |
| All other industries | 4.20 | 5.22 |
| Total | 100.00 | 100.00 |

Geographical Importance of the State's Forest Products Industry

Although the forest products industry does not qualify as a basic industry for the State as a whole, this industry is a component of the economic base of two sub-State districts in the southeastern portion of the State (see appendix 2 for a listing of counties by district). Between 1970 and 1980, the forest products industry's importance increased in both areas.

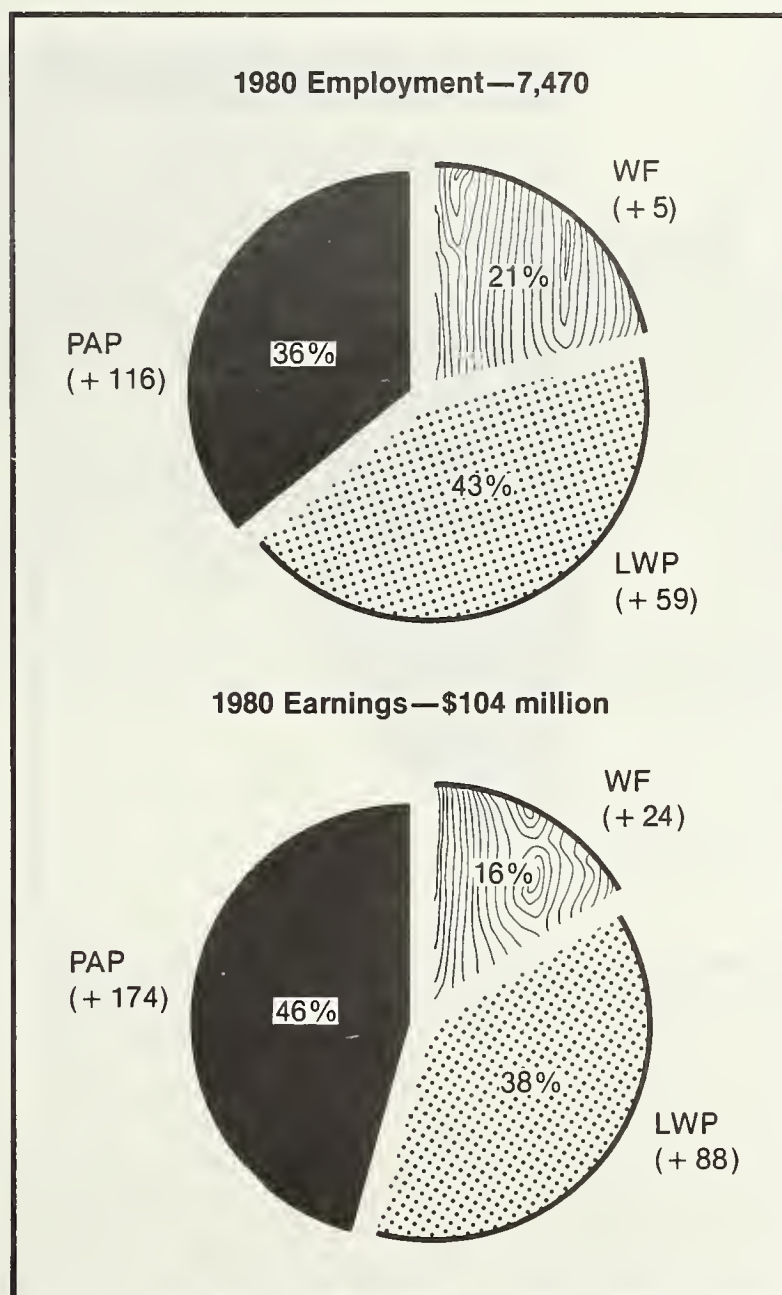


Source: Sub-State estimates for 1970 and 1980 were derived from unpublished county data series provided by the U.S. Department of Commerce, Regional Economic Information System, Washington, DC; and from the Department's *County Business Patterns*.

Composition of the State's Forest Products Industry

Oklahoma's forest products industry is comprised of paper and allied products, lumber and wood products (not including mobile homes), and wood furniture manufacturing. In 1980, lumber and wood products accounted for the largest share of approximately 7,500 workers employed by Oklahoma's forest products industry; however paper and allied products had the largest share of 1980 earnings.

Paper and allied products employment increased substantially during the 1970's. The growth rate for this segment was over five times the average for all industries in the Nation (22.3 percent). The growth rate for lumber and wood products employment was much greater for Oklahoma than across the Nation. Employment in wood furniture, which is the smallest segment of the State's forest products industry, barely changed between 1970 and 1980. During this period, earnings in the State's forest products industry doubled. The largest share of the increase (60 percent) can be attributed to paper and allied products.

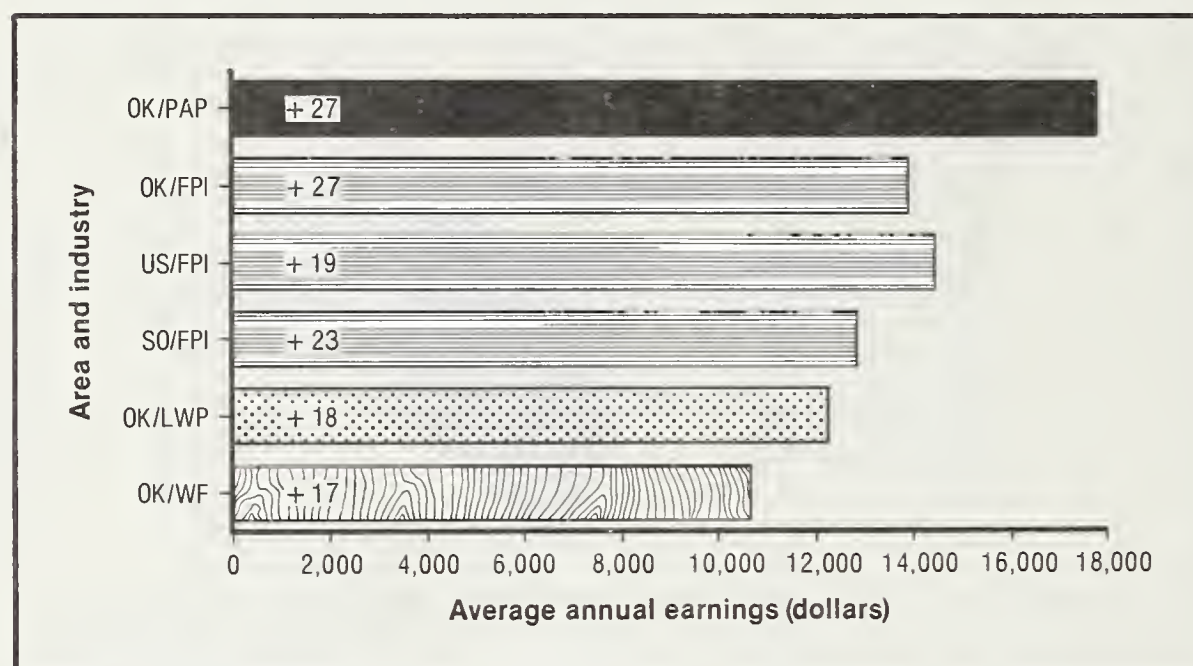


Numbers in parentheses show percentage of change from 1970 to 1980.

Average Annual Earnings per Worker

Average annual 1980 earnings per worker in paper and allied products were greater than were earnings in the other two segments of the forest products industry. Higher average skill levels, capital investment per worker, and unions account for this difference. Earnings in the wood furniture industry were nearly 40 percent less than those for paper and allied products and were significantly below the average for all forest products industries in the South and the United States.

The rate of growth in earnings was greater for Oklahoma's forest products industry than for the South and the Nation. The difference resulted primarily from the growth in earnings of the paper and allied products segment. The rate of change for lumber and wood products and for wood furniture was less than that of the United States and the South.

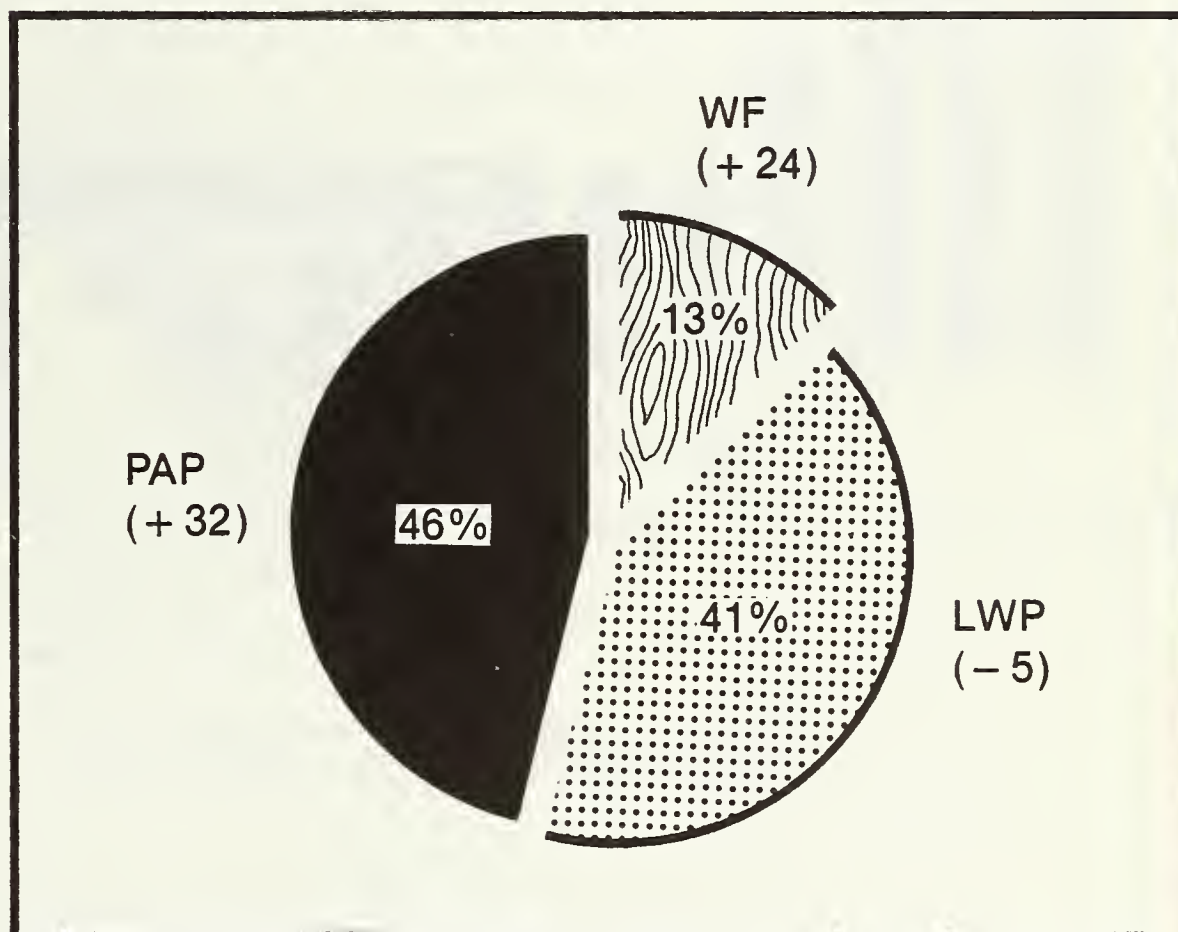


Numbers in bars show percentage of change from 1970 to 1980.

Value Added by the Forest Products Industry

Value added by manufacturing represents income payments made directly to workers and business owners. It is equal to the value of shipments less the cost of materials, parts, supplies, fuel, goods purchased for resale, electric energy, and contract work. Unlike value of shipments, value added includes only the economic contributions of the State's forest products industry. Consequently, value added by manufacturing is considered a better monetary gauge of the relative economic importance of a manufacturing industry than are total shipments.

In 1977, paper and allied products accounted for 46 percent of the \$182 million of value added by Oklahoma's forest products industry. Between 1972 and 1977, the value added by paper and allied products increased by nearly one-third, while wood furniture increased by 24 percent. Meanwhile, value added decreased in lumber and wood products.

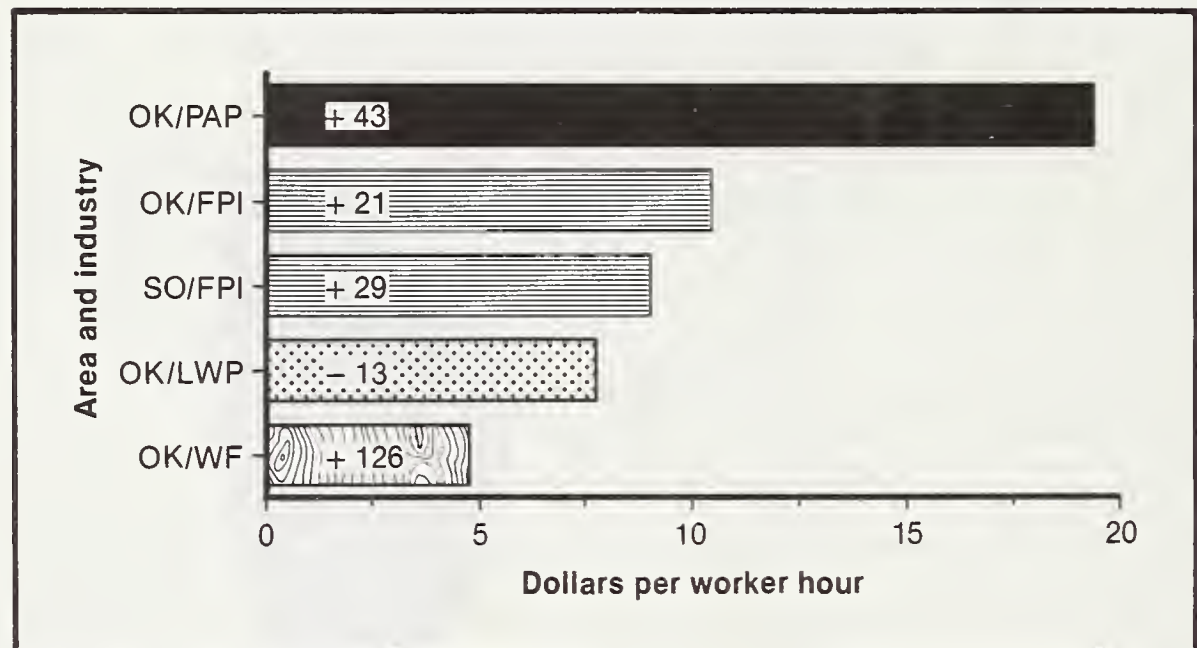


Numbers in parentheses show percentage of change from 1972 to 1977.

Capital Productivity

Increases in productivity are necessary for an industry to remain competitive in the marketplace. Productivity of an industry is measured in terms of value added minus payrolls per worker hour—VAMP (see table 3 for an explanation of how productivity was calculated for Oklahoma's forest products industry). This measure of productivity adjusts for wide differences in payroll among industries and represents profits before taxes.

Not surprisingly, paper and allied products had by far the highest productivity in Oklahoma's forest products industry. Productivity per worker hour was almost twice the average for the State's forest products industry. Paper and allied products is more capital intensive and in the past has attracted considerable investment in new facilities and equipment. During the mid-1970's, this segment exhibited a larger gain in productivity than the average for the South. Oklahoma's wood furniture industry experienced an even larger percentage of gain in productivity; but in absolute terms, this gain was much less than that of the paper and allied products segment.

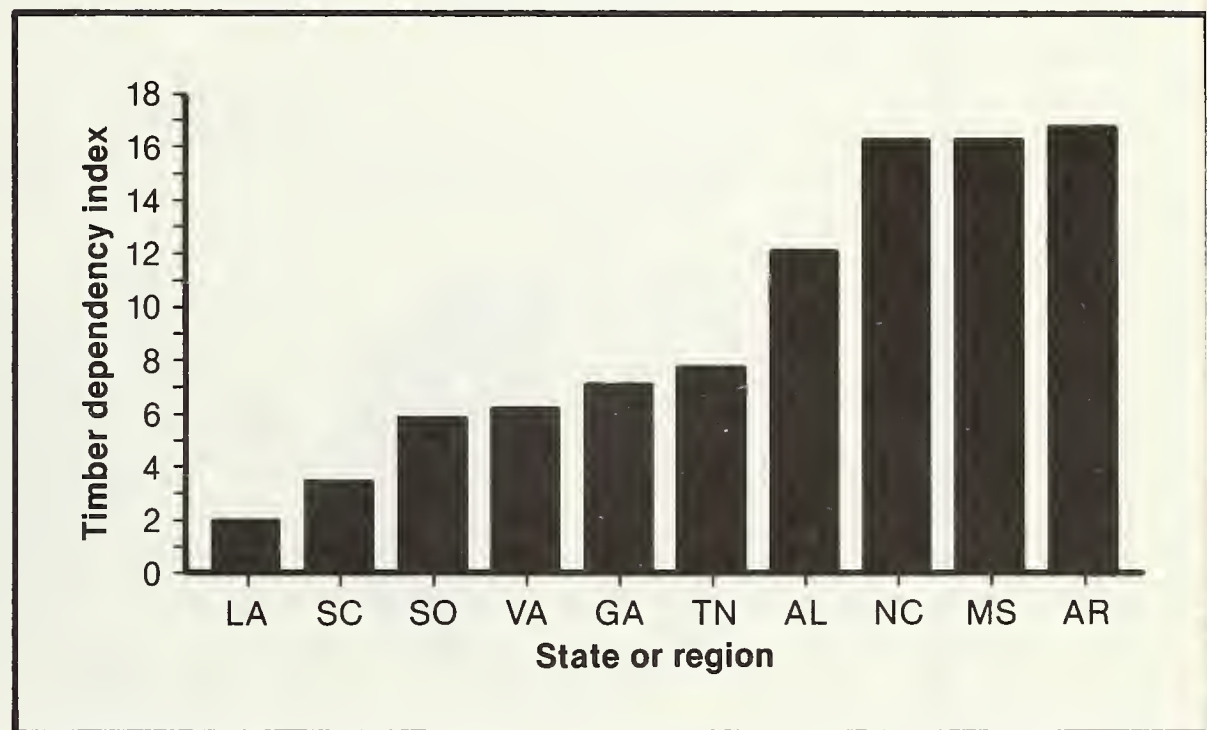


Numbers in bars show percentage of change from 1972 to 1977.

The Forest Products Industry in the South

Importance of the Industry Across the South

The dependency indicators suggest that in 1980 all but four States in the South manufactured forest products in excess of statewide needs. Oklahoma, in addition to Florida, Kentucky, and Texas, was not self-sufficient with respect to forest products; that is, these States imported more forest products than they exported. Consequently, on net balance, their respective forest products industries did not generate new dollars from the outside. In three States—Arkansas, Mississippi, and North Carolina—the forest products industry accounted for approximately one of six basic employees.



Industry Composition

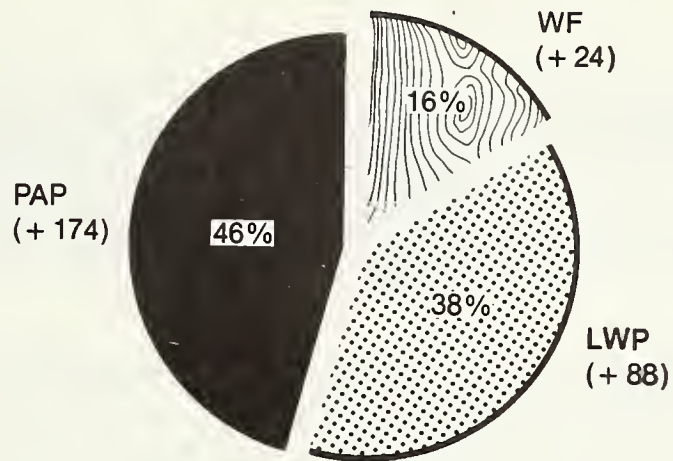
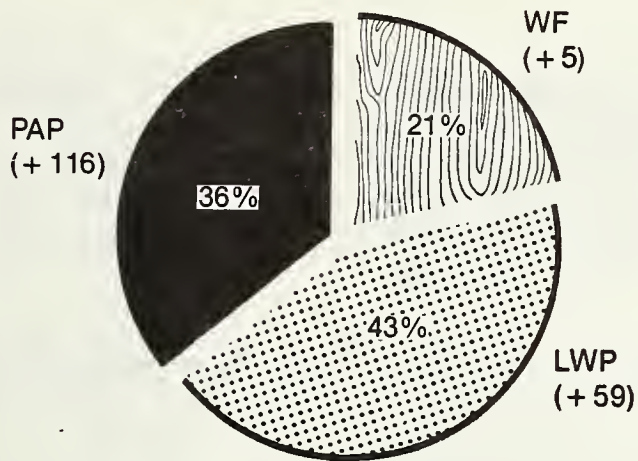
Lumber and wood products accounted for a slightly larger share of Oklahoma's 1980 forest products industry employment than it did for either the South or the Nation. Although paper and allied products employment was less important in Oklahoma than for the United States, its growth in Oklahoma was much greater than in either the South or the Nation.

In terms of earnings, the composition of Oklahoma's forest products industry closely resembled that for the United States. But growth in earnings in lumber and wood products and paper and allied products—particularly the latter—was substantially more than for the United States. Wood furniture earnings grew more rapidly in Oklahoma than in either the South or the Nation.

OKLAHOMA

1980 Employment—7,470

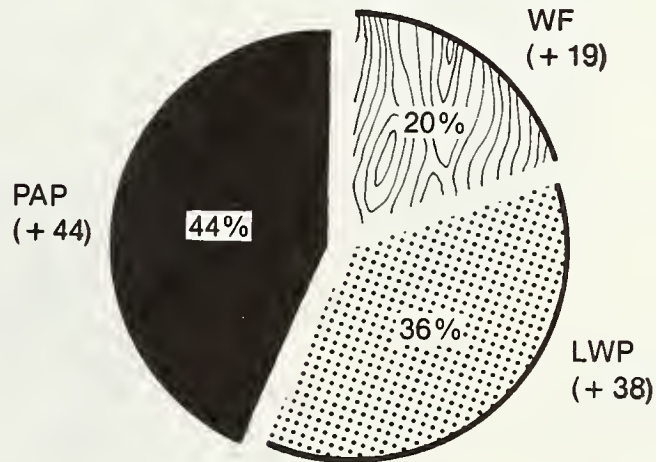
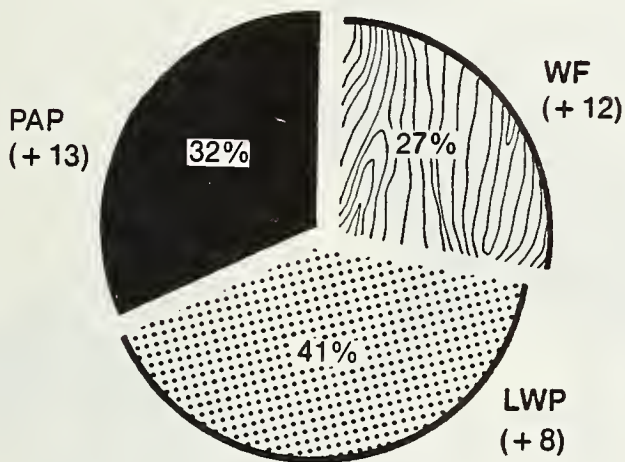
1980 Earnings—\$104 million



THE SOUTH

1980 Employment—620,567

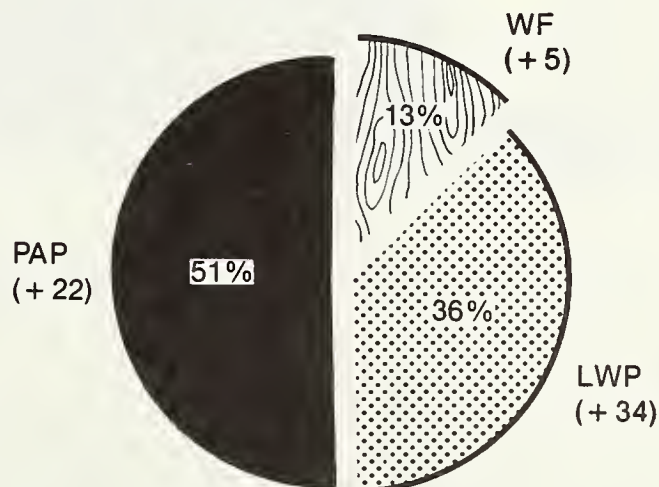
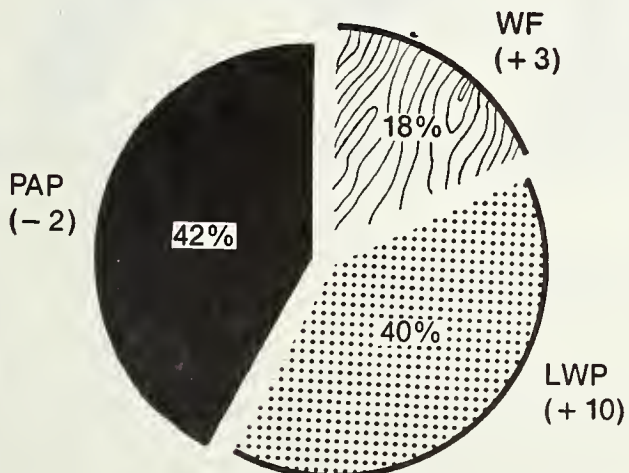
1980 Earnings—\$7.96 billion



UNITED STATES

1980 Employment—1,634,000

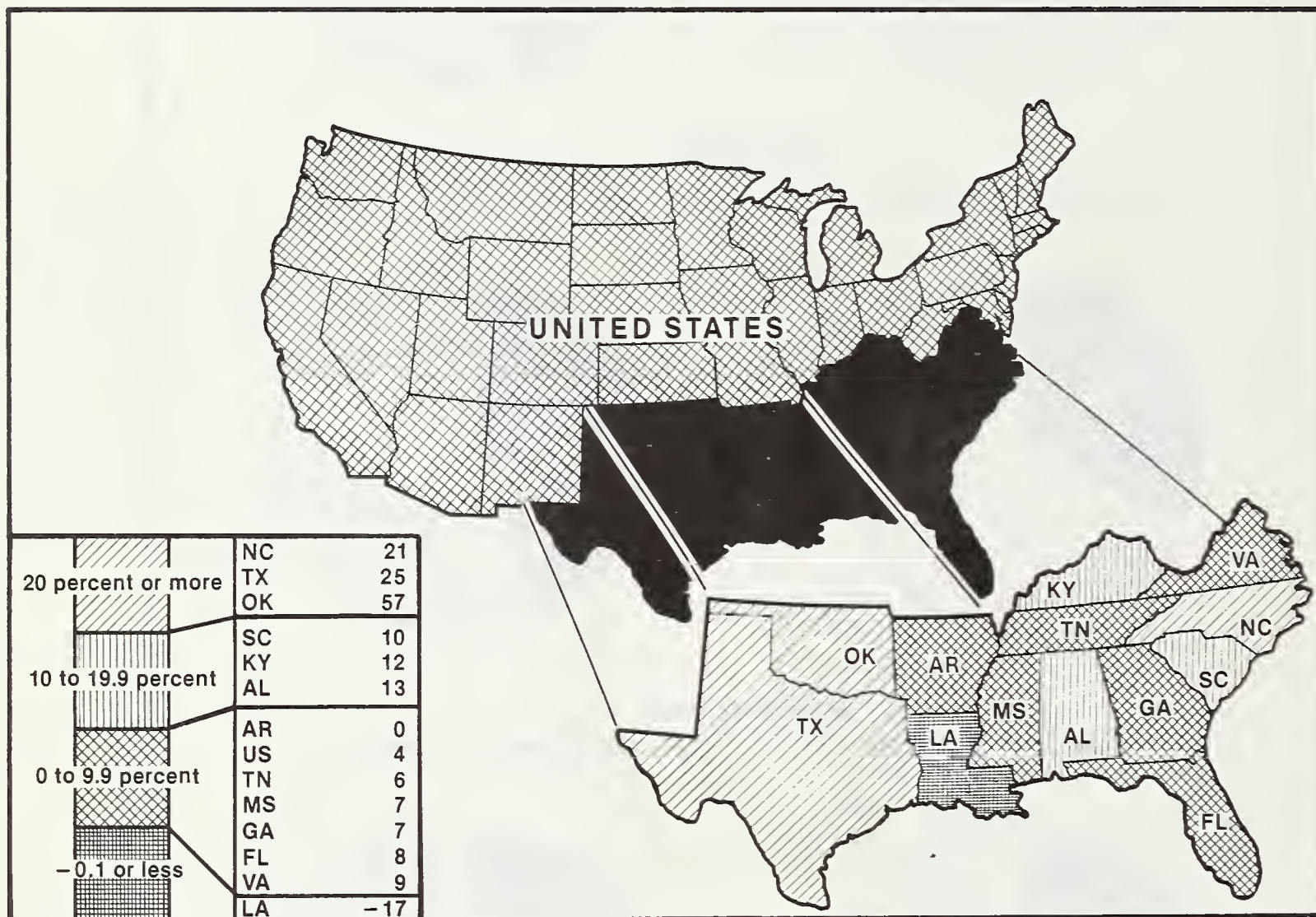
1980 Earnings—\$23.65 billion



Numbers in parentheses show percentage of change from 1970 to 1980.

Growth of Employment

With the exceptions of Arkansas and Louisiana, forest products industry employment in each of the Southern States grew faster than did the U.S. counterpart. Between 1970 and 1980, employment in Oklahoma and Texas grew faster than the all-industry average of 22.3 percent. The growth in employment in Oklahoma's forest products industry greatly surpassed the national rate and ranked first among the 13 Southern States.

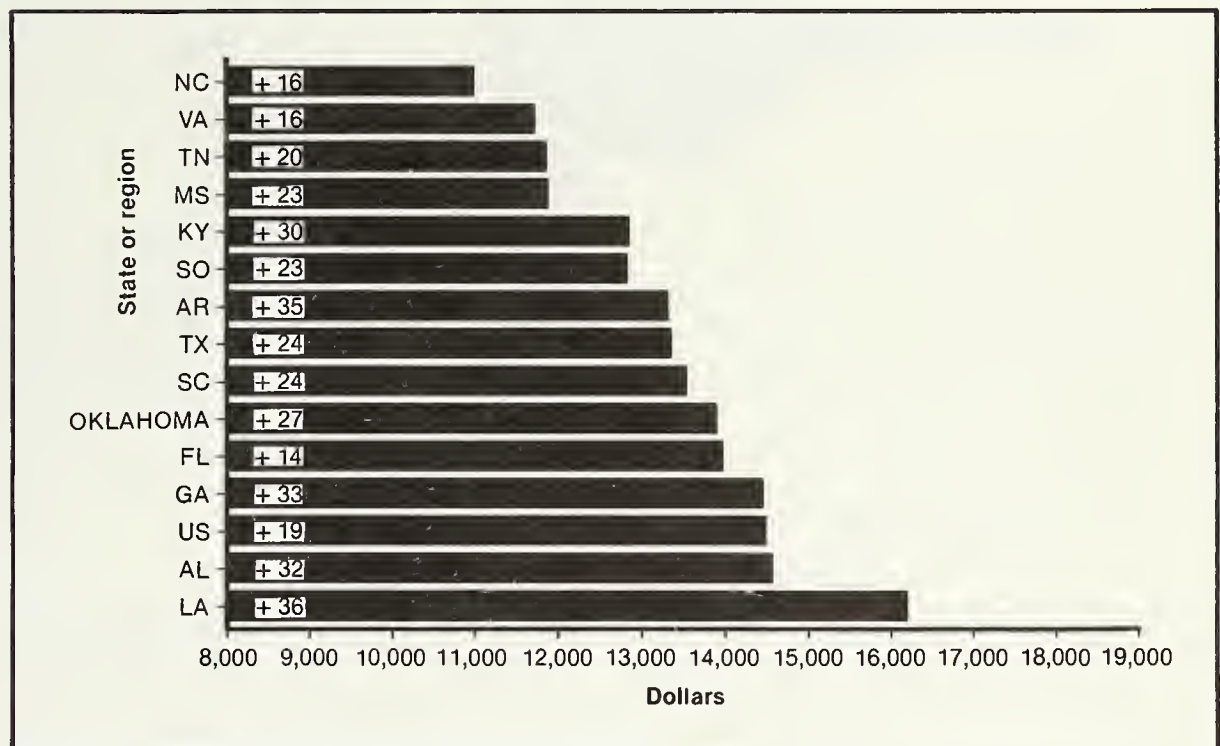


Average Annual Earnings

Average annual earnings per worker in the forest products industry differed significantly by State in 1980: Approximately \$5,000 separated the State with the highest (Louisiana) from the State with the lowest (North Carolina). Pulp and allied products manufacturing, which has traditionally paid higher wages than have other segments of the forest products industry, dominated Louisiana's forest products industry. Wood furniture, which has paid lower average wages, dominated North Carolina's industry.

Average annual forest products industry earnings in Oklahoma were greater than for the South, but less than for the United States. Earnings increased faster in Oklahoma than in either the South or the Nation. Among the 13 Southern States it ranked fifth and sixth, respectively, in average earnings in 1980 and in the rate of change between 1970 and 1980.

Generally speaking, paper and allied products dominated the forest products industry in the States with the highest average annual earnings. This relationship reflects higher job skills and unions in pulp and paper manufacturing. Wages, by and large, were the lowest in States where the labor-intensive wood furniture industry was more important.



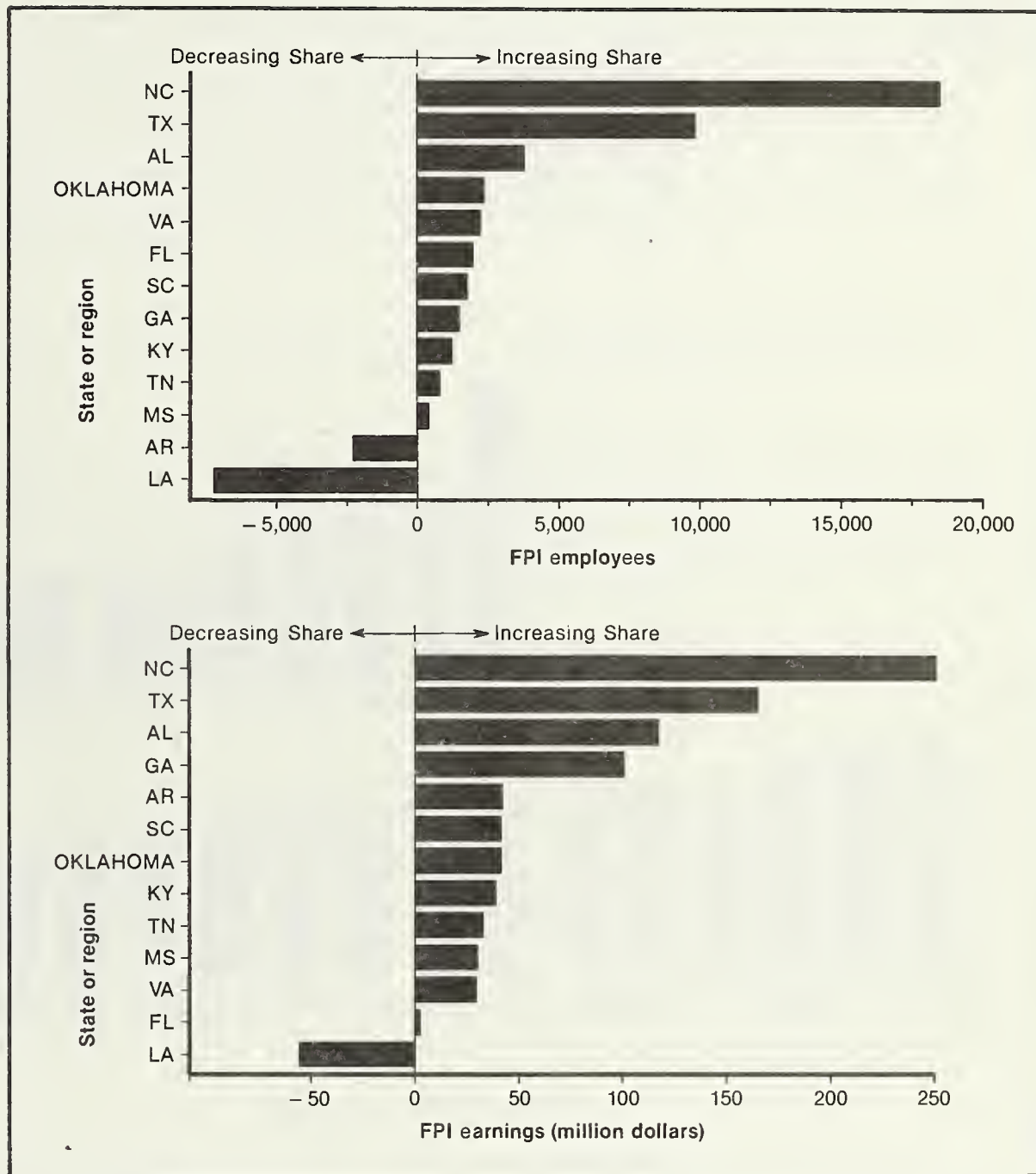
Numbers in bars show percentage of change from 1970 to 1980.

Shift in Employment and Earnings

The regional shift shows how much more or less employment and earnings a State would have had in the forest products industry in 1980 had it grown at the national rate. For example, Oklahoma had approximately 2,500 more employees in 1980 than it would have had if its forest products industry had grown at the national rate.

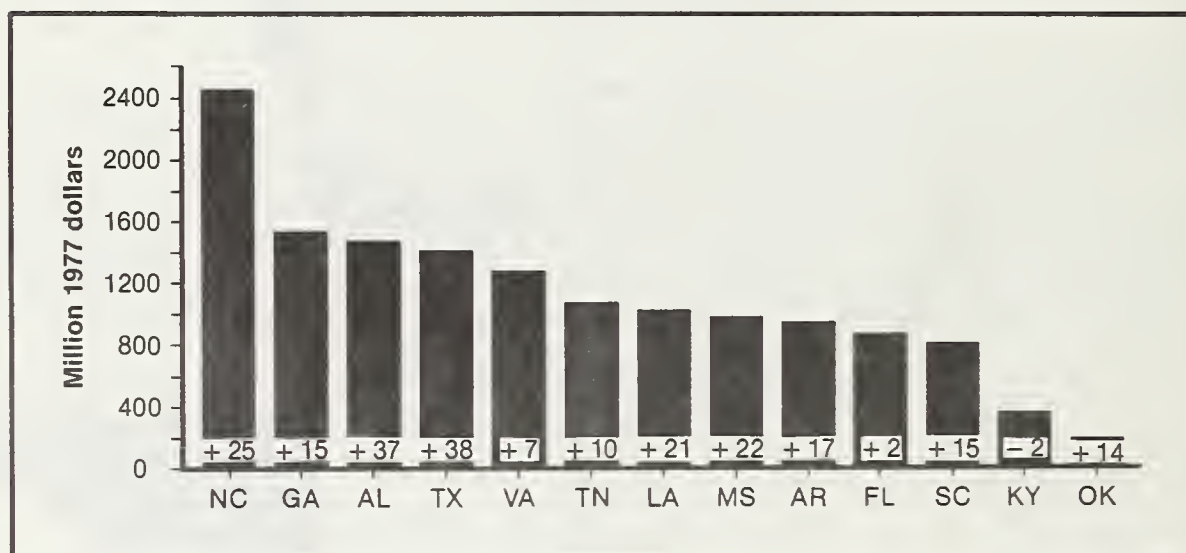
Between 1970 and 1980, employment in the forest products industry increased in every Southern State except Louisiana and Arkansas. Moreover, all but these two States increased their share of the Nation's forest products industry employment, and all but Louisiana increased their share of earnings.

Increased shares of employment and earnings reflect the comparative advantage the South's forest products industry enjoyed over this industry in the rest of the Nation. Several factors (for example, relatively lower labor costs, lower raw materials costs, and closer proximity to markets) might account for a region's comparative advantage, although adverse trends with respect to one factor need not reduce a region's advantage. In the South, for instance, increasing labor costs need not adversely affect its comparative advantage if increased capital or labor productivity offsets higher labor costs.



Value Added by the Forest Products Industry

In 1977, the forest products industry of North Carolina produced more value added than any other State in the South. Georgia was second among the 13 Southern States, followed by Alabama. Texas was not only one of the leading States in terms of total value added, it also led the South in terms of the change in value added between 1972 and 1977. Oklahoma was last in terms of total value added. Although the increase in total value added for the forest products industry was rather modest between 1972 and 1977, wood furniture, and paper and allied products experienced substantial gains (24 percent and 32 percent, respectively). One State, Kentucky, produced less value added in 1977 than in 1972.



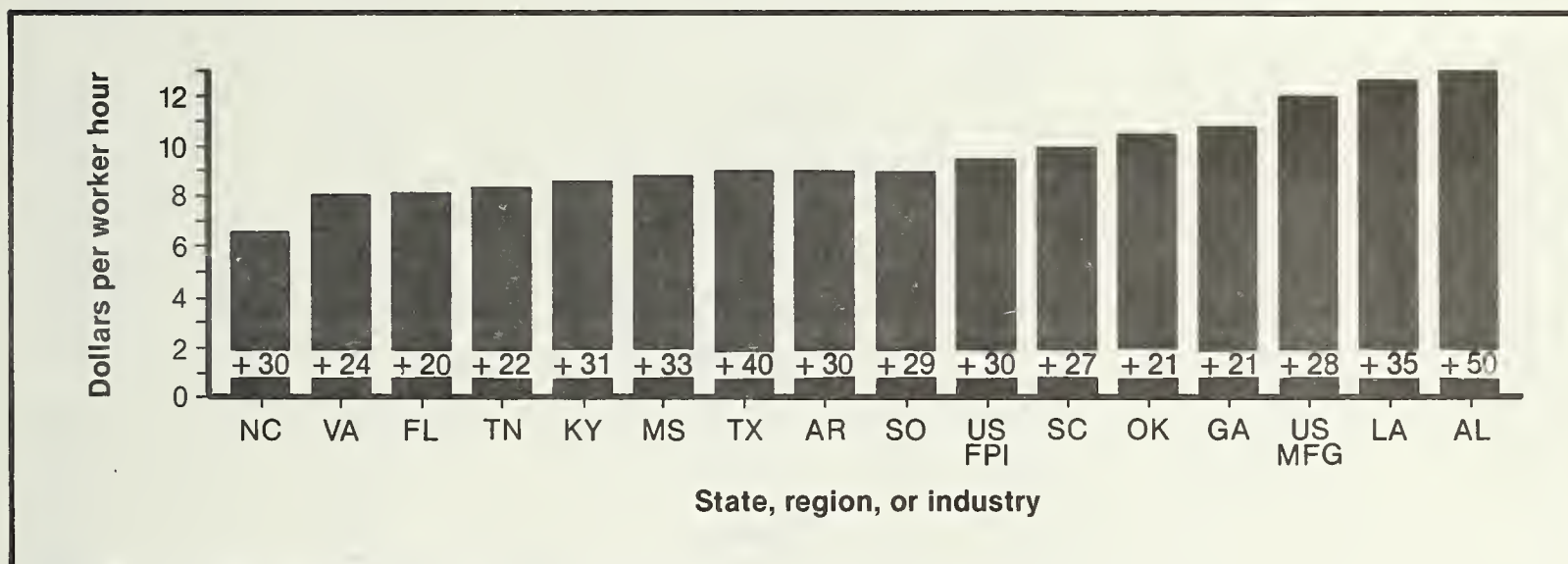
Numbers in bars show percentage of change from 1972 to 1977.

Capital Productivity

Paper and allied products industry, which is more capital-intensive and, therefore, more susceptible to technological change than are other segments of the forest products industry, exhibited the highest productivity within the forest products industry. Wood furniture, on the other hand, is the most labor-intensive of the three. North Carolina, for example, produced more value added than any other State in the South, but the productivity of its forest products industry in 1977 was the lowest. This reflects the dominant role of labor-intensive wood furniture manufacturing in North Carolina.

Increases in productivity exceeded increases in payroll per worker between 1972 and 1977 for all the Southern States. This relationship is in part responsible for the South's comparative advantage in the forest products industry.

In 1977, capital productivity of the forest products industry in Oklahoma was exceeded by only three Southern States. But between 1972 and 1977, the productivity of Oklahoma's forest products industry increased by only 21 percent. This rate of change was lower than for all other Southern States except Florida and Georgia and resulted from sagging profits in the lumber and wood products segment.



Numbers in bars show percentage of change from 1972 to 1977.

Acknowledgment

Many helpful suggestions of several reviewers were incorporated in this research report. This project was funded in part by USDA Forest Service, Resource Program and Assessment Staff, and State and Private Forestry, Area Planning and Development, State Planning for Forest Resources.

Appendix 1 Tables

Table 1—Total labor and proprietorial employment and income, by industry, Oklahoma, 1980^{1/}

| Industry number | Industry | Employees | Total income |
|-----------------|--|-----------------|---|
| | | <i>Number</i> | <i>Thousand 1977 dollars^{2/}</i> |
| Wage and salary | | | |
| 1 | Agriculture | 17,233 | 478,448 |
| 2 | Agricultural services, forestry, and fisheries | 5,445 | 53,890 |
| 3 | Coal mining | 1,608 | 37,879 |
| 4 | Oil and gas extraction | 68,329 | 1,422,500 |
| 5 | Metal mining | 76 | 806 |
| 6 | Nonmetallic minerals | 1,988 | 27,985 |
| 7 | Construction | 56,585 | 987,264 |
| 8 | Food and kindred products | 16,421 | 210,316 |
| 9 | Tobacco | 0 | 0 |
| 10 | Textile mill production | 1,364 | 12,290 |
| 11 | Apparel and other textiles | 10,989 | 78,058 |
| 12 | Paper and allied products | 2,673 | 47,477 |
| 13 | Printing and publishing | 10,843 | 125,708 |
| 14 | Chemical and allied products | 3,288 | 58,814 |
| 15 | Petroleum refining | 8,515 | 209,477 |
| 16 | Rubber and miscellaneous plastics | 11,790 | 190,082 |
| 17 | Leather and leather products | 579 | 4,224 |
| 18 | Lumber and wood products, excluding mobile homes ^{3/} | 3,213 | 39,239 |
| 19 | Mobile homes | 370 | 4,519 |
| 20 | Wood furniture | 1,584 | 16,815 |
| 21 | Other furniture and fixtures | 623 | 6,613 |
| 22 | Stone, clay and glass products | 10,778 | 167,583 |
| 23 | Primary metals | 5,707 | 99,911 |
| 24 | Fabricated metals | 23,650 | 352,855 |
| 25 | Machinery, excluding electrical | 38,866 | 614,782 |
| 26 | Electrical machinery | 13,355 | 190,974 |
| 27 | Transportation equipment, excluding motor vehicles | 10,131 | 183,582 |
| 28 | Motor vehicles | 9,659 | 215,689 |
| 29 | Ordnance | ^{3/} — | ^{3/} — |
| 30 | Instruments and related equipment | 2,896 | 39,217 |
| 31 | Miscellaneous manufacturing | 2,492 | 23,855 |
| 32 | Railroad transportation | 4,388 | 94,378 |
| 33 | Trucking and warehousing | 20,405 | 387,318 |
| 34 | Local transit | 1,368 | 15,067 |

See footnotes at end of table.

Table 1—Total labor and proprietorial employment and income, by industry, Oklahoma, 1980^{1/} (continued)

| Industry number | Industry | Employees | Total income |
|-----------------|---|-----------|-------------------------------------|
| | | Number | Thousand 1977 dollars ^{2/} |
| Wage and salary | | | |
| 35 | Air transportation | 9,607 | 200,303 |
| 36 | Pipeline transportation | 2,662 | 53,993 |
| 37 | Transportation services | 1,201 | 23,911 |
| 38 | Water transportation | 46 | 847 |
| 39 | Communications | 16,926 | 309,851 |
| 40 | Electric, gas, and sanitation services | 13,149 | 245,589 |
| 41 | Wholesale trade | 69,406 | 1,073,247 |
| 42 | Retail trade | 193,527 | 1,587,884 |
| 43 | Banking | 19,567 | 238,119 |
| 44 | Other credit agencies | 10,907 | 172,954 |
| 45 | Insurance | 15,421 | 258,390 |
| 46 | Real estate and combinations | 12,251 | 128,026 |
| 47 | Hotel and other lodging | 9,816 | 65,911 |
| 48 | Personal, miscellaneous business, and repair services | 42,889 | 508,745 |
| 49 | Auto repair service | 8,375 | 126,051 |
| 50 | Amusement | 6,190 | 41,762 |
| 51 | Motion pictures | 1,590 | 8,799 |
| 52 | Private households | 21,340 | 58,880 |
| 53 | Medical and other health | 57,310 | 780,079 |
| 54 | Private education | 9,452 | 75,178 |
| 55 | Nonprofit organizations | 36,454 | 240,003 |
| 56 | Miscellaneous services | 15,560 | 469,891 |
| 57 | Federal civilian | 47,741 | 729,579 |
| 58 | Federal military | 46,102 | 328,392 |
| 59 | State and local government | 188,590 | 1,681,499 |
| Proprietorial | | | |
| 60 | Farm proprietors | 86,025 | 356,160 |
| 61 | Nonfarm proprietors | 112,172 | 1,509,808 |
| Total | | 1,421,487 | 17,671,466 |

^{1/} Source of data for this table for Oklahoma, other States of the South, and the United States: unpublished data, U.S. Department of Commerce, Regional Economics Measurements Division, Regional Economic Information System (REIS), Washington, DC, 1982. Unpublished data used by the U.S. Department of Commerce in preparing their *County Business Patterns* (CBP) series on employment and payroll were used to differentiate wood-related from nonwood-related employment and earnings. For example, CBP data were used to separate mobile homes (no. 19) from the lumber and wood products (no. 18) industry. Wood furniture (no. 20) was similarly separated from other furniture and fixtures (no. 21).

^{2/} The Personal Consumption Expenditures (PCE) deflator, 1977 = 100, was used to deflate nominal dollars.

^{3/} Included with fabricated metals and other related industries.

Table 2—Calculation of 1980 dependency indexes for Oklahoma
(In percent)

| Industry | Employment | | Oklahoma excess employment ^{1/} | Dependency index ^{2/} |
|---|------------|------------------|--|-----------------------------------|
| | Oklahoma | United States | | |
| Agriculture | 1.40 | 1.46 | — | — |
| Agricultural services, forestry, and fisheries | .44 | .62 | — | — |
| Farm proprietors | 7.10 | 3.03 | 4.07 | 27.10 |
| Coal mining | .13 | .27 | — | — |
| Oil and gas extraction | 5.64 | .60 | 5.04 | 33.50 |
| Metal mining | .01 | .11 | — | — |
| Nonmetallic minerals | .16 | .14 | .03 | .18 |
| Construction | 4.59 | .74 | — | — |
| Food and kindred products | 1.33 | 1.87 | — | — |
| Tobacco | 0 | .07 | — | — |
| Textile mill production | .11 | .93 | — | — |
| Apparel and other textiles | .89 | 1.39 | — | — |
| Paper and allied products | .22 | .76 | — | 0 |
| Printing and publishing | .88 | 1.37 | — | — |
| Chemical and allied products | .27 | 1.22 | — | — |
| Petroleum refining | .70 | .22 | .48 | 3.22 |
| Rubber and miscellaneous plastics | .96 | .80 | .18 | 1.18 |
| Leather and leather products | .05 | .26 | — | — |
| Lumber and wood products, excluding mobile homes | .26 | .71 | — | — |
| Mobile homes | .03 | .05 | — | — |
| Wood furniture | .13 | .32 | — | — |
| Other furniture and fixtures | .05 | .19 | — | — |
| Stone, clay, and glass products | .89 | .73 | .16 | 1.06 |
| Primary metals | .46 | 1.26 | — | — |
| Fabricated metals | 1.95 | 1.77 | .18 | 1.19 |
| Machinery, excluding electrical | 3.21 | 2.73 | .48 | 3.17 |
| Electrical machinery | 1.08 | 2.31 | — | — |
| Transportation equipment, excluding motor vehicles | .82 | 1.21 | — | — |
| Motor vehicles | .78 | .87 | — | — |
| Instruments and related equipment | .23 | .77 | — | — |
| Miscellaneous manufacturing | .20 | .47 | — | — |
| Railroad transportation | .36 | .58 | — | — |
| Trucking and warehousing | 1.68 | 1.40 | .28 | 1.89 |
| Local transit | .11 | .29 | — | — |
| Air transportation | .79 | .50 | .29 | 1.96 |
| Pipeline transportation | .22 | .02 | .20 | 1.31 |
| Transportation services | .10 | .22 | — | — |
| Water transportation | 0 | .23 | — | — |
| Communications | 1.37 | 1.48 | — | — |
| Electrical, gas, and sanitation services | 1.09 | .90 | .18 | 1.21 |
| Wholesale trade | 5.63 | 5.79 | — | — |
| Retail trade | 15.70 | 16.50 | — | — |
| Banking | 1.59 | 1.72 | — | — |
| Other credit agencies | .88 | .99 | — | — |

See footnotes at end of table.

Table 2—Calculation of 1980 dependency indexes for Oklahoma (continued)
(In percent)

| Industry | Employment | | Oklahoma excess employment ^{1/} | Dependency index ^{2/} |
|--|------------|------------------|--|-----------------------------------|
| | Oklahoma | United States | | |
| Insurance | 1.25 | 1.89 | — | — |
| Real estate and combinations | .99 | 1.16 | — | — |
| Hotel and other lodging | .80 | 1.20 | — | — |
| Personal, miscellaneous business, and repair services | 3.48 | 4.69 | — | — |
| Auto repair service | .69 | .63 | .06 | .41 |
| Amusement | .50 | .84 | — | — |
| Motion pictures | .13 | .24 | — | — |
| Medical and other health | 4.65 | 5.71 | — | — |
| Private education | .77 | 1.47 | — | — |
| Nonprofit organizations | 2.96 | 3.01 | — | — |
| Miscellaneous services | 1.26 | 1.63 | — | — |
| Federal civilian | 3.94 | 3.27 | .67 | 4.47 |
| Federal military | 3.81 | 2.68 | 1.12 | 7.49 |
| Nonfarm proprietors | 9.26 | 7.66 | 1.60 | 10.63 |
| Total ^{3/} | 100.00 | 100.00 | 15.02 | 100.00 |

^{1/}Oklahoma employment minus U.S. employment. Figures may not be exactly equal to Oklahoma minus U.S. because of rounding. Dashes signify no excess employment.

^{2/}Individual industry excess employment expressed as a percentage of Oklahoma's total excess employment (sum of column 4).

^{3/}Sum of parts may not equal totals because of rounding.

**Table 3—Value added, hours worked, payroll, and capital productivity,^{1/}
Oklahoma forest products industry, 1977^{2/}**

| Industry | Value added | Payroll | Hours worked | Productivity | Productivity change, 1972-77 |
|------------------------------|-------------------|---------|-----------------|-----------------|------------------------------------|
| | - - \$Million - - | | Million | \$VAMP per hour | Percent |
| Lumber and wood products | 74.5 | 34.2 | 5.2 | 7.75 | -12.83 |
| Wood furniture | 23.0 | 12.0 | 2.3 | 4.78 | 125.59 |
| Paper and allied products | 84.1 | 26.0 | 3.0 | 19.37 | 43.46 |

^{1/} Productivity equals value added minus payroll (VAMP) divided by hours worked. For a discussion of VAMP, see W. Charles Sawyer and Joseph A. Ziegler. 1980. "The use of VAMP shift as a predictive model." Unpublished paper presented at the annual meeting of the Western Regional Science Association, Monterey, California.

^{2/} Source: U.S. Bureau of the Census, Census of Manufactures, for 1972 and 1977, Oklahoma and the United States, available in 1976 and 1980, respectively. In the few instances where data were not available for some subindustry segments, the distribution of the number of establishments was used to estimate nondisclosures.

Appendix 2
Oklahoma Counties by
Sub-State Planning and
Development Districts

| District code | Counties |
|------------------|---|
| 1 | Craig, Delaware, Mayes, Nowata, Ottawa, Rogers, Washington |
| 2 | Adair, Cherokee, McIntosh, Muscogee, Okmulgee, Sequoyah, Wagoner |
| 3 | Choctaw, Haskell, Latimer, Le Flore, McCurtain, Pittsburg, Pushmataha |
| 4 | Atoka, Bryan, Carter, Coal, Garvin, Johnston, Love, Marshall, Murray, Pontotoc |
| 5 | Hughes, Lincoln, Okfuskee, Pawnee, Payne, Pottawatomie, Seminole |
| 6 | Creek, Osage, Tulsa |
| 7 | Alfalfa, Blaine, Garfield, Grant, Kay, Kingfisher, Major, Noble |
| 8 | Canadian, Cleveland, Logan, Oklahoma |
| 9 | Caddo, Comanche, Cotton, Grady, Jefferson, McClain, Stephens, Tillman |
| 10 | Beckham, Custer, Greer, Harmon, Jackson, Kiowa, Roger Mills, Washita |
| 11 | Beaver, Cimarron, Dewey, Ellis, Harper, Texas, Woods, Woodward |

Maki, Wilbur R.; Schallau, Con H; Foster, Bennett B.; Redmond, Clair H.

Oklahoma's forest products industry: performance and contribution to the State's economy, 1970 to 1980. Res. Pap. PNW-363. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; 1986. 22 p.

Employment and earnings in Oklahoma's forest products industry, like those of most Southern States, grew significantly between 1970 and 1980. In fact, Oklahoma's share of the Nation's forest products employment and earnings increased during this period. In 1980, lumber and wood products accounted for the largest share of the industry's employment, but paper and allied products had a larger share of the earnings. In 1977, pulp and allied products had higher productivity than either lumber and wood products or wood furniture.

Keywords: Forest products industries, economics (forest products industries), employment (forest products industries), Oklahoma.

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Pacific Northwest Research Station
319 S.W. Pine St.
P.O. Box 3890
Portland, Oregon 97208

U.S. Department of Agriculture
Pacific Northwest Research Station
319 S.W. Pine Street
P.O. Box 3890
Portland, Oregon 97208

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